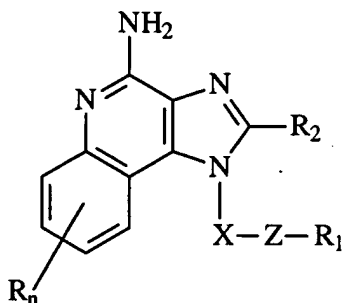


WHAT IS CLAIMED IS:

1. A compound of the formula (I):



(I)

wherein: **X** is  $-CHR_3-$ ,  $-CHR_3$ -alkyl-, or  $-CHR_3$ -alkenyl-;

**Z** is  $-S-$ ,  $-SO-$ , or  $-SO_2-$ ;

**R<sub>1</sub>** is selected from the group consisting of:

- alkyl;
- aryl;
- heteroaryl;
- heterocyclyl;
- alkenyl;
- $-R_4$ -aryl;
- $-R_4$ -heteroaryl;
- $-R_4$ -heterocyclyl;

**R<sub>2</sub>** is selected from the group consisting of:

- hydrogen;
- alkyl;
- alkenyl;
- aryl;
- heteroaryl;
- heterocyclyl;
- alkyl-Y-alkyl;

- alkyl-Y- alkenyl;  
-alkyl-Y-aryl; and  
- alkyl or alkenyl substituted by one or more substituents selected  
from the group consisting of:

5

-OH;  
-halogen;  
-N(R<sub>3</sub>)<sub>2</sub>;  
-CO-N(R<sub>3</sub>)<sub>2</sub>;  
-CO-C<sub>1-10</sub> alkyl;  
10 -CO-O-C<sub>1-10</sub> alkyl;  
-N<sub>3</sub>;  
-aryl;  
-heteroaryl;  
-heterocyclyl;  
15 -CO-aryl; and  
-CO-heteroaryl;

10

15

each R<sub>3</sub> is independently H or C<sub>1-10</sub> alkyl;

R<sub>4</sub> is alkylene or alkenylene;

Y is -O- or -S(O)<sub>0-2</sub>;

20

n is 0 to 4; and

each R present is independently selected from the group consisting of C<sub>1-10</sub>  
alkyl, C<sub>1-10</sub> alkoxy, hydroxy, halogen and trifluoromethyl;  
or a pharmaceutically acceptable salt thereof.

25

2. A compound of claim 1 wherein Z is -S-.

3. A compound of claim 1 wherein Z is -SO<sub>2</sub>-.

4. A compound of claim 1 wherein R<sub>1</sub> is -alkyl.

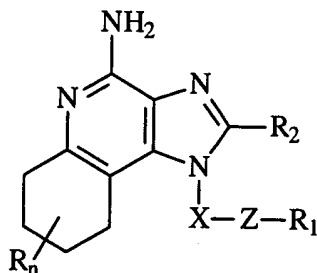
30

5. A compound of claim 4 wherein R<sub>1</sub> is -methyl.

6. A compound of claim 1 wherein R<sub>1</sub> is aryl.
7. A compound of claim 1 wherein R<sub>1</sub> is heteroaryl.
- 5 8. A compound of claim 1 wherein X is  $-(CH_2)_{2-6}-$ .
9. A compound of claim 1 wherein R<sub>2</sub> is H.
- 10 10. A compound of claim 1 wherein R<sub>2</sub> is  $-alkyl-O-alkyl$ .
11. A compound of claim 1 wherein R<sub>2</sub> is  $-alkyl$ .
12. A compound selected from the group consisting of:
  - 2-butyl-1-[4-(phenylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 15 2-butyl-1-[2-(phenylthio)ethyl]-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-butyl-1-[4-(phenylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-butyl-1-[4-(methylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-butyl-1-[4-(methylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 1-[2-(phenylthio)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 20 1-[4-(phenylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 1-[4-(methylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 1-[4-(phenylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 1-[4-(methylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-butyl-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 25 2-methyl-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-ethyl-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-hexyl-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-(2-methoxyethyl)-1-[5-(methylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 30 2-butyl-1-[5-(methylthio)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-butyl-1-[5-(methylsulfinyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-butyl-1-[3-(methylsulfonyl)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine; and

2-butyl-1-[3-(phenylsulfonyl)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
or a pharmaceutically acceptable salt thereof.

13. A compound of the formula (II)



(II)

wherein: **X** is  $-\text{CHR}_3-$ ,  $-\text{CHR}_3\text{-alkyl-}$ , or  $-\text{CHR}_3\text{-alkenyl-}$ ;

**Z** is  $-\text{S-}$ ,  $-\text{SO-}$ , or  $-\text{SO}_2-$ ;

**R<sub>1</sub>** is selected from the group consisting of:

- alkyl;
- aryl;
- heteroaryl;
- heterocyclyl;
- alkenyl;
- R<sub>4</sub>-aryl;
- R<sub>4</sub>-heteroaryl; and
- R<sub>4</sub>-heterocyclyl;

**R<sub>2</sub>** is selected from the group consisting of:

- hydrogen;
- alkyl;
- alkenyl;
- aryl;
- heteroaryl;
- heterocyclyl;
- alkyl-Y-alkyl;
- alkyl-Y-alkenyl;
- alkyl-Y-aryl; and



19. A compound of claim 13 wherein R<sub>1</sub> is heteroaryl.
20. A compound of claim 13 wherein X is  $-(CH_2)_{2-6}-$ .
- 5 21. A compound of claim 13 wherein R<sub>2</sub> is H.
22. A compound of claim 13 wherein R<sub>2</sub> is  $-\text{alkyl}-O-\text{alkyl}$ .
23. A compound of claim 13 wherein R<sub>2</sub> is  $-\text{alkyl}$ .
- 10 24. A compound selected from the group consisting of:
  - 1-[5-(methylsulfonyl)pentyl]-2-propyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-methyl-1-[3-(methylthio)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-methyl-1-[3-(methylsulfonyl)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 15 2-ethyl-1-[3-(methylthio)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-ethyl-1-[3-(methylsulfonyl)propyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-methyl-1-[4-(methylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-methyl-1-[4-(methylsulfinyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-ethyl-1-[4-(methylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 20 2-ethyl-1-[4-(methylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 1-[4-(methylsulfonyl)butyl]-2-propyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-butyl-1-[4-(methylsulfinyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-methyl-1-[2-(methylthio)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-methyl-1-[2-(methylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 25 2-methyl-1-[4-(methylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-ethyl-1-[2-(methylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 1-[2-(methylsulfonyl)ethyl]-2-propyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-butyl-1-[4-[(2,4-difluorophenyl)thio]butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 2-butyl-1-[4-[(2,4-difluorophenyl)sulfonyl]butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;
  - 30 2-butyl-1-[4-(ethylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;
  - 2-butyl-1-[4-[(1,1-dimethylethyl)thio]butyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;
  - 2-butyl-1-[4-[(4-fluorophenyl)thio]butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

- 2-butyl-1-{4-[(4-fluorophenyl)sulfonyl]butyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 2-ethyl-1-{4-[(1-methylethyl)thio]butyl}-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 1-{4-[(3,5-dichlorophenyl)thio]butyl}-2-ethyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 1-[4-(cyclopentylsulfonyl)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 5 1-{4-[(3,5-dichlorophenyl)sulfonyl]butyl}-2-ethyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 1-[4-(cyclohexylthio)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 1-[4-(butylthio)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 1-{4-[(4-chlorophenyl)thio]butyl}-2-ethyl-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 1-[4-(butylsulfonyl)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 10 2-ethyl-1-{4-[(4-fluorophenyl)thio]butyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 2-ethyl-1-{4-[(1-methylethyl)sulfonyl]butyl}-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 2-ethyl-1-[4-(ethylthio)butyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 2-ethyl-1-[4-(ethylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 1-[4-(cyclohexylsulfonyl)butyl]-2-ethyl-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 15 2-butyl-1-{2-[(1-methylethyl)sulfonyl]ethyl}-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 2-butyl-1-[2-(phenylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 2-butyl-1-{2-[(4-fluorophenyl)sulfonyl]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 2-butyl-1-{2-[(1,1-dimethylethyl)sulfonyl]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 2-butyl-1-{2-[(1,1-dimethylethyl)thio]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 20 2-butyl-1-[2-(propylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 2-butyl-1-[2-(propylthio)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 2-butyl-1-{2-[(2-methylpropyl)sulfonyl]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 2-butyl-1-{2-[(2-methylpropyl)thio]ethyl}-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 2-butyl-1-[2-(ethylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 25 2-butyl-1-[2-(ethylthio)ethyl]-1*H*-imidazo[4,5-*c*]quinoline-4-amine;  
 2-butyl-1-[2-(methylsulfonyl)ethyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 2-methyl-1-[6-(methylsulfonyl)hexyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 1-[5-(phenylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 1-[5-(methylsulfonyl)pentyl]-2-(trifluoromethyl)-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 30 2-(2-methoxyethyl)-1-[5-(phenylsulfonyl)pentyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 2-ethyl-1-[4-(pyrimidin-2-ylthio)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;  
 2-ethyl-1-[4-(pyrimidin-2-ylsulfonyl)butyl]-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

2-methyl-1-[4-(methylsulfonyl)butyl]-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

2-methyl-1-[5-(methylsulfonyl)pentyl]-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

5 2-methyl-1-{4-[(1-methylethyl)sulfonyl]butyl}-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

2-methyl-1-{4-[(4-fluorophenyl)sulfonyl]butyl}-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine; and

10 2-methyl-1-{4-[(1,1-dimethylethyl)sulfonyl]butyl}-6,7,8,9-tetrahydro-1*H*-imidazo[4,5-*c*]quinolin-4-amine;

or a pharmaceutically acceptable salt thereof.

25. A pharmaceutical composition comprising a therapeutically effective amount of a compound of claim 1 and a pharmaceutically acceptable carrier.

15

26. A pharmaceutical composition comprising a therapeutically effective amount of a compound of claim 12 and a pharmaceutically acceptable carrier.

20 27. A method of inducing cytokine biosynthesis in an animal comprising administering a therapeutically effective amount of a compound of claim 1 to the animal.

28. The method of claim 27 wherein the cytokine is IFN- $\alpha$ .

25 29. A method of treating a viral disease in an animal comprising administering a therapeutically effective amount of a compound of claim 1 to the animal.

30. A method of treating a neoplastic disease in an animal comprising administering a therapeutically effective amount of a compound of claim 1 to the animal.

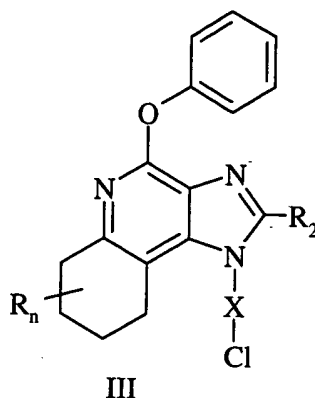
30 31. A method of inducing cytokine biosynthesis in an animal comprising administering a therapeutically effective amount of a compound of claim 12 to the animal.



32. The method of claim 31 wherein the cytokine is IFN- $\alpha$
33. A method of treating a viral disease in an animal comprising administering a therapeutically effective amount of a compound of claim 12 to the animal.
- 5 34. A method of treating a neoplastic disease in an animal comprising administering a therapeutically effective amount of a compound of claim 12 to the animal.
- 10 35. A pharmaceutical composition comprising a therapeutically effective amount of a compound of claim 13 and a pharmaceutically acceptable carrier.
36. A method of inducing cytokine biosynthesis in an animal comprising administering a therapeutically effective amount of a compound of claim 13 to the animal.
- 15 37. The method of claim 36 wherein the cytokine is IFN- $\alpha$ .
38. A method of treating a viral disease in an animal comprising administering a therapeutically effective amount of a compound of claim 13 to the animal.
- 20 39. A method of treating a neoplastic disease in an animal comprising administering a therapeutically effective amount of a compound of claim 13 to the animal.
40. A pharmaceutical composition comprising a therapeutically effective amount of a compound of claim 24 and a pharmaceutically acceptable carrier.
- 25 41. A method of inducing cytokine biosynthesis in an animal comprising administering a therapeutically effective amount of a compound of claim 24 to the animal.
42. The method of claim 41 wherein the cytokine is IFN- $\alpha$ .
- 30 43. A method of treating a viral disease in an animal comprising administering a therapeutically effective amount of a compound of claim 24 to the animal.

44. A method of treating a neoplastic disease in an animal comprising administering a therapeutically effective amount of a compound of claim 24 to the animal.

5 45. A compound of the formula (III):



wherein: X is  $-\text{CHR}_3-$ ,  $-\text{CHR}_3\text{-alkyl-}$ , or  $-\text{CHR}_3\text{-alkenyl-}$ ;

$\text{R}_2$  is selected from the group consisting of:

- 10                    -hydrogen;  
                     -alkyl;  
                     -alkenyl;  
                     -aryl;  
                     -heteroaryl;  
15                    -heterocyclyl;  
                     -alkyl-Y-alkyl;  
                     - alkyl-Y- alkenyl;  
                     -alkyl-Y-aryl; and  
                     - alkyl or alkenyl substituted by one or more substituents selected  
20                    from the group consisting of:  
                     -OH;  
                     -halogen;  
                     - $\text{N}(\text{R}_3)_2$ ;  
                     - $\text{CO-N}(\text{R}_3)_2$ ;  
25                    - $\text{CO-C}_{1-10}$  alkyl;

5

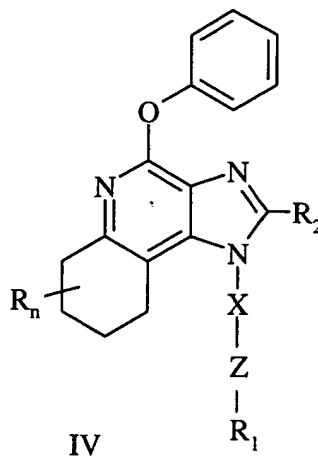
-CO-O-C<sub>1-10</sub> alkyl;  
 -N<sub>3</sub>;  
 -aryl;  
 -heteroaryl;  
 -heterocyclyl;  
 -CO-aryl; and  
 -CO-heteroaryl;

10

each **R**<sub>3</sub> is independently H or C<sub>1-10</sub> alkyl;  
**Y** is -O- or -S(O)<sub>0-2</sub>;  
**n** is 0 to 4; and  
 each **R** present is independently selected from the group consisting of C<sub>1-10</sub> alkyl, C<sub>1-10</sub> alkoxy, hydroxy, halogen and trifluoromethyl;  
 or a pharmaceutically acceptable salt thereof.

15

46. A compound of the formula (IV):



wherein: **X** is -CHR<sub>3</sub>-, -CHR<sub>3</sub>-alkyl-, or -CHR<sub>3</sub>-alkenyl-;

**Z** is -S-, -SO-, or -SO<sub>2</sub>-;

20

**R**<sub>1</sub> is selected from the group consisting of:

-alkyl;  
 -aryl;  
 -heteroaryl;  
 -heterocyclyl;

-alkenyl;  
 -R<sub>4</sub>-aryl;  
 -R<sub>4</sub>-heteroaryl; and  
 -R<sub>4</sub>-heterocyclyl;

5        **R<sub>2</sub>** is selected from the group consisting of:

-hydrogen;  
 -alkyl;  
 -alkenyl;  
 -aryl;  
 10       -heteroaryl;  
          -heterocyclyl;  
          -alkyl-Y-alkyl;  
          -alkyl-Y-alkenyl;  
          -alkyl-Y-aryl; and  
 15       -alkyl or alkenyl substituted by one or more substituents selected  
          from the group consisting of:  
          -OH;  
          -halogen;  
          -N(R<sub>3</sub>)<sub>2</sub>;  
 20       -CO-N(R<sub>3</sub>)<sub>2</sub>;  
          -CO-C<sub>1-10</sub> alkyl;  
          -CO-O-C<sub>1-10</sub> alkyl;  
          -N<sub>3</sub>;  
          -aryl;  
 25       -heteroaryl;  
          -heterocyclyl;  
          -CO-aryl; and  
          -CO-heteroaryl;

each **R<sub>3</sub>** is independently H or C<sub>1-10</sub> alkyl;  
 30       **R<sub>4</sub>** is alkylene or alkenylene;  
          **Y** is -O- or -S(O)<sub>0-2</sub>;  
          **n** is 0 to 4; and

each **R** present is independently selected from the group consisting of C<sub>1-10</sub> alkyl, C<sub>1-10</sub> alkoxy, hydroxy, halogen and trifluoromethyl; or a pharmaceutically acceptable salt thereof.

- 5     47.     A compound of claim 1 wherein Z is -SO-.
48.     A compound of claim 13 wherein Z is -SO-.